

### Abstract

A side load compensating air spring piston having an elliptical cross-section. The side load compensating air spring comprises an air spring sleeve forming a chamber and  
5 having a rolling lobe. One end of the sleeve is attached to a tilted end cap for side load compensation. The other end of the sleeve has a rolling lobe engaged with a piston elliptical outer surface. The piston elliptical outer surface is disposed at a 90° angle to an elliptical stress  
10 distribution in the sleeve, thereby rendering the stress distribution uniform in the sleeve rolling lobe portion as it rolls on the piston.